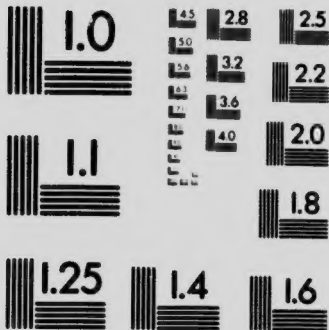


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Dont's in Connection With Irrigation

Address delivered before the Western Canada Irrigation Association
at Nelson, B. C., July 1918

— BY —

Mr. Don. H. Bark, Chief of Irrigation Investigation Division,
Canadian Pacific Railway, Strathmore, Alberta

Mr. Chairman, Ladies and Gentlemen:—

I am certainly glad to be able to attend this convention again. As many of you know, I hail from the broad rolling prairies east of Calgary, the home of the tall alfalfa—and we can grow alfalfa there. In that part of Alberta we have three of the largest irrigation projects on the North American continent. It has been very dry this year, but even though our irrigation projects are large they cover only a small portion of the arable areas in Alberta, hence some portions are bound to be affected by this dry weather. Our crops on the irrigated portions are looking very well indeed, but the non-irrigated portions will not have a bumper crop this year, I am sorry to say. Leaving those burning prairies with their crops suffering from lack of water, except where irrigated, and coming across the main line of the C.P.R. and down the Arrow Lakes into British Columbia, I could not help but be impressed with the wonderful opportunities that exist here in British Columbia for home making, for irrigation and for developing a new industry. It certainly is a beautiful country—and then, too, you have so many resources that we do not have on the prairies.

I could not help but dream of a little farm alongside one of your many lakes where one could have an ample water supply from one of the many tributary streams and use it for irrigation on his thirty, forty, fifty or even 160 acre cleared farm. He might put in a power plant that would light and even heat his home by electricity. Such is possible. I have seen it done in similar localities with great success. With a climate such as you have here which produces such a luxuriant growth of vegetation, one could grow all of the different kinds of fruit that he wanted, and could in addition grow enough forage for his horses, cows and pigs. With a plentiful supply of fruit served with rich cream from one's Jersey cows, and all of the home grown vegetables one could use, what more could a man ask? As for recreation, with all of your lakes and forests, one could surely hunt and fish to his heart's content. With all of these natural environments, and installed in a nice bungalow on the shores of one of these lakes, I cannot imagine a finer combination on the North American continent.

Now, ladies and gentlemen, the speakers that you will listen to today and tomorrow will undoubtedly tell you what to do in connection with irrigation, and they will tell you all about it from A to Z. I came here with the firm de-

termination to tell you several things **not to do**. These to my mind are just as important in connection with irrigation and even more so than the things you are to do.

Irrigation is a broad subject and no one speaker could hope to cover much of it in the short time that would be at his disposal, so I will try and touch some of the high spots only. I shall mention some of the major factors, and when I am finished if any questions have been brought to your mind, I will be glad to have you ask them of me, although I cannot guarantee to be able to answer all of them.

I think one of the first things that an irrigator in an arid country should assure himself of would be an ample water supply. Do not start out on an irrigation proposition without being assured of an ample water supply, for nothing is more disgusting and disheartening in a dry year than to have your crops burn up or your yield decreased because of an inadequate water supply. Therefore I want to impress upon you not to start out on an irrigation project of whatever size without an ample supply of water. It is vital to your success. I am quite sure that you already have some very excellent records as to the adequacy of the water supplies in the various localities in the full and accurate records kept by your Land Department. There is no doubt but that they have more complete records than exist in the country to the South, with which I am more familiar.

The amount of water required for the irrigation of different classes of crops and different kinds of soil in different climates has been pretty well fixed by investigators. Your local District Engineer can determine for you how much water will be necessary for your different classes of crops on different types of soil for any area you have in mind. After that all that is necessary for you to do is to get the records from the government department and find out the average supply available over a series of years. Do not take the record for one year, because the stream run-off for one year is no more reliable than the rainfall record for one year. For instance if you had taken our rainfall record for 1915 and compared it with our 1918 record in Alberta you would be surprised to find the great variation. We have had almost no rain in certain parts of Alberta this year. Your stream flow will be just as erratic.

Another vital factor is, bringing this supply to the farm proper. You must have ample ditch capacity. Do not attempt to irrigate or start an irrigation proposition, however large or small, without ample ditches, good, safe, strong and properly designed. It is extremely hard for the irrigator to be trying to irrigate his alfalfa or his suffering wheat or potatoes and then find after getting his water nicely started that his ditch has broken or his water supply is shut off. He will then have to lay off for two or three days fixing up his ditches instead of watering his crops. Make your ditch strong and of ample capacity. You don't have to keep your ditch full, but remember no ditch will carry more than its capacity. Make your ditches good and safe and it will be money in your pocket in the end.

In Alberta we have broad rolling prairies. You can drive in many places for a hundred miles and never see a tree or hill, let alone a mountain. When we "prairie irrigators" come over to British Columbia, to tell you something about irrigation, some of us may possibly have in mind those broad flat fields and will want to insist that you should prepare your land in much the same way as we prepare the prairie land, but when I see the steep nature of your land with only a flat here and there, I realize that the methods applicable to

Alberta, Idaho, Oregon, Washington and Colorado, and one or two other states where I have had irrigation experience, are not strictly applicable to your problem of irrigation. The type of system to use must be carefully thought out so as to be well adapted to the land and slope you are to irrigate. One point that I do want to emphasize is that you must prepare your ground for irrigation, whatever the type of system you use. So many people start out on an irrigated farm or an irrigated orchard without preparing it for the application of the water. Don't do that, because it is all wrong. Careful preparation pays. You will rarely find land that is ready made for irrigation.

In order to get the best results from your irrigation water, it must be applied evenly to the soil. Take for instance a field of alfalfa, wheat, or an orchard. There is a certain specific amount of water that the crop in question needs to give the best results. If you apply more water than the crop needs your yield will be decreased and the quality will be impaired. If you apply less water, you cannot get maximum results. It is easy to see that a crop needs a specific amount of water in a specific season. If your land is rough, irregular and rolling, you will be applying more water to some parts than to others. Unless your ground is so prepared so that you can apply that proper amount to all parts you will not get the proper results. Careful, even preparation will allow you to irrigate more land in a day, with less water and still produce a greater yield. Don't fail to prepare your land carefully. Perhaps you have a stream with which you have been irrigating forty or fifty acres. Now, if you will fix your ditches so that there will not be so much seepage, and your land so that you can spread the water evenly and give a lighter application you may be able to irrigate eighty acres instead of fifty. I have seen this very thing done time and time again, and so I say, don't start out on an irrigation proposition without the idea that you are going to prepare your land first, because the land as you find it in its original state is very seldom adapted to irrigation. It must be leveled off.

There are several types of irrigation systems in use. I don't know just how many of them are adapted to use in this section. The original method used years and years ago, was more or less similar to the present free flooding method. They would run contour ditches here and there and flood out of them haphazardly. This was a rather crude, careless method of irrigation. Years before this the method of irrigation in mountain districts was to throw a brush, earth, or manure dam across the draws, causing the water to flood back and run off over the dam. Then it would run down the draw to the next dam and over that again to the next hollow, thus soaking up all of the hollows, but applying none to the other high parts.

Another system would be the free flooding method where they brought the ditch around the hills on a contour. The water would be dammed up in the ditch and they would let it flow out over the ditch bank to the next contour ditch below. In flat countries, where it is possible to do so, a much better system has been evolved through the experience of many years. This is flooding between borders. The Californians call it the "strip method" of irrigation. It simply consists of running a ditch along the upper side of your field on a very slight grade nearly paralleling a contour and flooding the water from that down the slope at right angles to it, between parallel dykes or ditches about 50, 75 or 100 feet apart. Under ideal conditions the land must be nearly level for this system. The only fall that there should be between the two dykes would be longitudinally and not crossways. If the land is prepared in this manner as you turn your water out the advancing stream

will spread between the two more or less parallel dykes, irrigating everything as it advances down the slope without very much trouble. That sort of system will require considerable preparation, depending upon the original slope and topography of your land. To install it where the land is rough and rolling might in some cases cost as much as one hundred dollars per acre. But that type of system would not be adapted to your fruit trees in this special district. You had better stick to the free flooding and the furrow method. Even these systems require preparation if there are any knolls projecting, for these will not absorb the same water as the hollows. Irrigated land must be levelled and smoothed up in order to get the best results. In the furrow system, which is used for potatoes and fruit trees, the furrows should be run more or less on a contour around the hills in order to eliminate some of the grade if it is too steep down the hill. Before you plant your potatoes or your fruit trees find out which way the water will run.

I ran across an amusing instance this spring where a man had planted potatoes with the idea of irrigating them, but he wanted all the potato rows to be seen from the road. In planting them at right angles to the road the rows were exactly level, however, and the water would not run down. If he had planted them with the rows running the same way as the road, he would not have had any trouble. This, of course, is not new to some of you who have been irrigating for some years. Careful preparation of your land pays not only in greater production, but also in the saving of water.

Another point that I wish to make is that diversification of crops pays. Don't attempt to farm without diversification. Don't put all of your eggs in one basket. Of course, we know that some noted man has said, "Put all of your eggs in one basket and watch that basket well." That may be all right with eggs, but it is not all right with agricultural operations.

If you have all wheat and along comes a hail storm, watching the basket won't do much good, but if you have some alfalfa, potatoes, fruit and corn, together with a reasonable number of dairy cattle a hail storm would not have done much damage. It might hurt some of your grain and fruit, but not your dairy stock or your alfalfa, and you would still have a lot of your income left. Diversification pays and pays big. It is a good balance wheel, or, shall I say, safety valve, to your agricultural operations. It does not matter whether you are a fruit farmer or a grain farmer or a stock rancher, or an alfalfa farmer, that rule will still hold good. Diversification of crops pays.

Now I want to spend a moment on the irrigation of each particular crop with a few pointers as to the way to plant these crops and handle them.

There is no doubt but that alfalfa is King of all Forage Plants. I firmly believe that without alfalfa, the irrigation projects of the West could never be successful. It has been a wonderful money maker for the farmers in many ways. I suppose you all know of the soil enriching power of alfalfa. How it has the power of attracting to its roots the little bacteria which live in the nodules and multiply very rapidly. These bacteria draw nitrogen from the air, and store it up in the soil in a form in which the plants can utilize it. Then when you plow up your alfalfa after having grown it for three or four years, you can grow a larger crop on that land than you ever grew before. The Eastern farmer who is not successful with alfalfa cannot compete with your yields without the use of commercial fertilizer. That is one of the great reasons, aside from its feeding value, that make alfalfa such a profitable crop.

I have seen in Southern Idaho time and time again where two men would settle down on a desert irrigation project right across the road from one another, having the same soil and climatic conditions. One farmer would plant alfalfa and the other wheat. The wheat farmer would produce forty bushels of wheat the first year; thirty bushels the second year; and from ten to twenty bushels of wheat the third year. That is all it would produce at the end of three or four years. What was wrong? He had all the necessary mineral constituents in his soil, but the soil was depleted of nitrogen. That same year, after having raised alfalfa for two seasons, the man across the way would plough up his alfalfa and put it into wheat. The same year that the wheat farmer was getting his ten to twenty bushels of wheat, the alfalfa man would produce eighty bushels of wheat on that alfalfa sod. This is no exaggeration, I am not trying to sell any land. You can do the same thing right here in British Columbia. Don't forget the soil enriching power of alfalfa.

Alfalfa is not hurt by the hail or frost to the same extent as the other crops. You don't have to plant it every year. There are many reasons why we should grow alfalfa, aside from its feeding value for dairy cows. One ton of it is as good as two tons of timothy for milk production. Don't plant alfalfa in your orchard as a cover crop, because it is too hard to eradicate.

In Southern Idaho, where they had as high as one hundred thousand acres of alfalfa at one time on one project they did not realize at first how hard it was to get rid of it. They do now. I want to emphasize this because you may want to plant it in your orchards, and if you do you may always have it. I have actually seen a man plough up alfalfa in the fall and plant pasture the next spring, and when he would attempt to pasture it, there would be so much more alfalfa than pasture that he would not utilize it as pasture for fear of bloating his dairy cows. I have then seen this same farmer grubbing the alfalfa out the fourth year, to get it out of the pasture.

We have found during the past three or four years in Alberta that it is fairly easy to kill alfalfa if you handle it right. I have tried several ways, but the best is by shallow fall plowing, followed by harrowing to bring the crowns to the surface where they are killed during the winter. The land is then plowed deep the following spring and you will have no trouble with the alfalfa. Last fall we ploughed some very deep, about six inches, with the idea of finding out if the one ploughing would do it, and this year we have a wonderful crop of wheat. Right beside it we tried spring ploughing and until the wheat was knee high, it was very hard to tell whether it was wheat or alfalfa. Spring ploughing has certainly not been effective in killing alfalfa for us in Alberta.

We believe in planting from 12 to 15 pounds of seed to the acre. If you plant ten pounds to the acre you will put fifty-two seeds on each square foot. If half of those fifty-two seeds grow, it will make the alfalfa very thick. You do not often get one half of the seeds to grow, however, but there isn't much use of planting over 15 pounds per acre. I have heard of them planting as much as thirty pounds to the acre, which would give them a seed to each square inch. But the best experience seem to indicate that if you can't get a good stand with 15 pounds you will not with 30.

Don't plant alfalfa too deep. I have seen them put it in three inches to keep it from being blown out. Don't do this as it will rarely germinate.

It is necessary to inoculate alfalfa in Alberta to get best results. I don't know if you need to do it here. If you do, it will be easy to find out how it is done from your Agricultural Experiment Stations.

I firmly believe it pays to plant nothing but local grown seed. I would not think of sending down to the States, to Idaho, Utah, Colorado or California to get alfalfa seed to plant in a more rigorous climate. I am advising all of our farmers in Alberta to get their seed locally. We have found that the Grimm is the most hardy variety we know anything about. We plant as much as possible of that seed. Some of your seedsmen may have what they think is Grimm and what they might sell to you as Grimm, when it is not. You cannot tell Grimm seed from the common variety, but the plant when in bloom can be told by some with a fairly good degree of accuracy.

The Grimm was originated by crossing common alfalfa with the yellow flowered variety. This causes the Grimm to have variegated blooms. The blossoms of Grimm will vary from red to dark purple to white. Some are greenish and others will vary all the way from red to dark purple.

White clover or red clover, peas, beans or vetches, will make a very valuable cover crop for your orchard, and will make the addition of commercial fertilizer unnecessary. If you can grow clover in your orchard for seed, you will have a profitable crop. You will hardly believe me when I assure you that in the prairies under irrigation on a three acre field we grew twelve and a half bushels of Alsike clover seed to the acre. This is worth better than thirty cents a pound, or roughly a little better than \$180 an acre. You would have less difficulty in growing clover here than in Alberta for your winters are mild. Our clover frequently winter kills.

Now for your pasture for your live stock. Don't ever plant one grass alone for pasture purposes; you should mix several grasses, and you will get better returns than from one straight grass. Select one grass like the Brome grass, which comes on early and is drouth resisting, but which may not do well where it is wet. Red Top will do well in the moist places, but comes on late. If you had all Red Top you would not have any pasture early in the spring. Then you must have some grass rich in protein, which makes for milk production. This should be a legume such as red, alsike or white clover. There are various mixtures that will do well for pasture, the principal idea is to have several grasses with different characteristics. Plant them together at the rate of from twenty to twenty-five pounds per acre. You will be surprised at the number of stock that mixed pasture under irrigation will maintain.

I want to say a word about the sweet clover which we have always looked upon as a weed in the Western States. When I came to Alberta three or four years ago I believed that a man was not only a fool to plant it, but in addition, he was a criminal. I have now changed my mind about the advisability of planting sweet clover. I found on a tour of investigation last winter, during which time I visited several State Agricultural Colleges, that they were planting the former weed in many places for both pasture and hay and that they were securing excellent results from it. The one thing that made us look upon it as a weed was because it grew everywhere, and as you know a weed is any plant out of place. When this Sweet Clover came up in our waste places along the roads and in the garden corners it made us look upon it as a worthless weed. Yet it always seemed to grow so luxuriantly and to make a larger amount of forage than our cultivated plants. Now it has been found that if either the White or the Yellow is planted and cared for an enormous growth will be produced, and if it is fenced so that either cows, sheep or horses can be forced to eat it that in about three or four days they will start

to eat it quite readily and relish it fully as well as any of the other cultivated grass.

Now, before I finish I would like to say something about the irrigation of potatoes. So many people make mistakes about irrigating potatoes. Don't put them in ground so dry that you have to force them up with irrigation. Irrigate the ground first and plant the potatoes afterwards. Also, it never pays to irrigate the potatoes when they are short or young, unless you have to. The point I want to make is that you should irrigate the soil first and plant afterwards. Lots of irrigation and less of irrigation will do more good than lots of irrigation and not much irrigation. Cultivate your potatoes and cultivate them often. Do it three times instead of only once. So many people irrigate their plants every time they think they look sickly or yellow. It is like some one taking a certain remedy no matter whether they have corns or a head ache. Potatoes should be grown with as little water as possible, but don't be afraid to irrigate if you do it sparingly. Never flood the surface of the soil up around the crowns of the plants. If you do so you will decrease the yield of your potatoes. Hill them up deeply and water between the rows. Don't let them dry out after young potatoes have set on your plants. As soon as you do irrigate the next time you will find that every eye on the little potato is a sprout. If you keep them just slightly moist and not let them dry out you will have excellent potatoes in the fall.

I must now bring my remarks to a close, though I feel there are yet many things I should like to tell you of the "Dont's in connection with irrigation."

I certainly thank you for your fine attention, and I hope you will let me come here again. If my present plans materialize I am going to come here and have a home some day on one of these beautiful lakes. (Applause).

Chairman: I am sure we are not at all disappointed, but extremely pleased with the address of Mr. Bark. Mr. Bark was speaking of alfalfa and said to plant local seed. Many years ago I was up in the Yukon, which is looked upon as an icy climate. The ground was, however, frozen underneath, but on top is a tundra which keeps the ground frozen, and immediately it is removed it thaws down some four or five feet, and you can grow the finest vegetables. In fact the best I have ever grown was near Dawson. At the outset when potatoes were first grown there, the potato was not a good potato but was very soggy. However, after a couple of years, when local seed was to be obtained, they obtained the finest potatoes ever grown in Canada, and potatoes which were exhibited and judged such.

The address is now open for discussion.

Mr. Wollaston: Will sweet clover bloat cows?

Mr. Bark: Yes and no. I made it a strong point to ask every one I came in contact with on the trip I have mentioned in regard to that. I have not had much experience myself, but in the experimental plots I planted white and yellow clover, and I am getting my own experience this year. I have asked that question of every one I have met who have had experience with it, and ninety-nine men out of one hundred will tell me that it will not bloat sheep or cows the way alfalfa will. I found one man who said that where one hundred would bloat on alfalfa only one would bloat on sweet clover. I think you can be safe in pasturing this without any danger whatever.

Mr Wollaston: Is there much difference between white and yellow clover?

Mr. Bark: Yes, the yellow looks to be the best pasture as it is finer, more leafy, and more reclining in nature. The yellow makes the best first cutting of hay, but the white makes the larger second cutting. One of our men claims to have cut 3 tons of the yellow at the first cutting this year. That was cured, dried hay as he hauled it to the barn, but I think it would have shrunk considerable before spring. In another place we have half an acre of white and yellow fenced off, with three horses pasturing on it, and I have had to mow it to keep it from getting ahead of the horses. These horses were not working and got no grain. I don't really want to over-emphasize the importance of sweet clover. I have great faith in it myself and have induced the people I am with to plant fifty acres of it. I want to try it out myself to a greater extent before I recommend it to the people of this Province.

Mr. Wollaston: Will it volunteer?

Mr. Bark: Yes, but this sweet clover is only a bi-ennial. You have to plant it every two years.

Mr. Heggie: Would you recommend it as a cover crop for an orchard?

Mr. Bark: I would not like to recommend it until I knew more about it.

Mr. Heggie: Will it grow on alkali soils.

Mr. Bark: Yes, it stands more alkali and drouth than any plant I know of. It is the one weed that I know of that has a food value. I have never seen it used for ensilage, but I have heard it is all right. We are going to go fairly strong on it until it is demonstrated more. The seeds do not have good germination, and you have to plant it at a higher rate than alfalfa.

Delegate: What crop do you cut for seed in alfalfa?

Mr. Bark: The first crop. We have to cut the first crop as the last might get nipped.

Mr. Wollaston: In Idaho do they cut the first crop for seed?

Mr. Bark: No, in most cases the second crop. It pays to grow alfalfa in rows for seed. It must have light and air and sun. It is the pollenization of the flowers and blossoms that you have to look out for. You will sometimes get a wonderful stand of blossoms and will have hardly a single seed, because the flowers will not trip—a bumble bee won't do it, there is only one bee that will do it. When it is tripped it explodes and scatters the pollen over the plant and flower. It must be climatic conditions that does it. If there is the right amount of humidity they will respond to the conditions. You need it in rows where every blossom is exposed to the sun and the heat, and when it is grown in that way you will hasten the exploding of the flower. With wheat if you have plenty of heat and plenty of water you will get plenty of seed, but with alfalfa you won't. The production of alfalfa seed is rather a fickle proposition.

